

Edexcel (U.K.) Pre 2017

Questions By Topic

M1 Chap05 Moments

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2. A steel girder AB , of mass 200 kg and length 12 m, rests horizontally in equilibrium on two smooth supports at C and at D , where $AC = 2$ m and $DB = 2$ m. A man of mass 80 kg stands on the girder at the point P , where $AP = 4$ m, as shown in Figure 1.

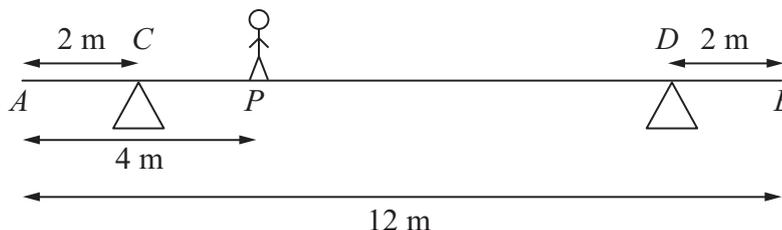


Figure 1

The man is modelled as a particle and the girder is modelled as a uniform rod.

- (a) Find the magnitude of the reaction on the girder at the support at C . (3)

The support at D is now moved to the point X on the girder, where $XB = x$ metres. The man remains on the girder at P , as shown in Figure 2.

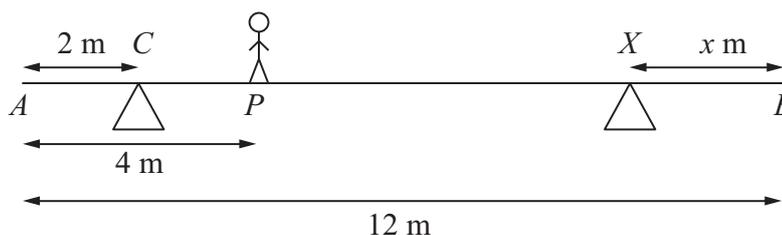


Figure 2

Given that the magnitudes of the reactions at the two supports are now equal and that the girder again rests horizontally in equilibrium, find

- (b) the magnitude of the reaction at the support at X , (2)
- (c) the value of x . (4)

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5.

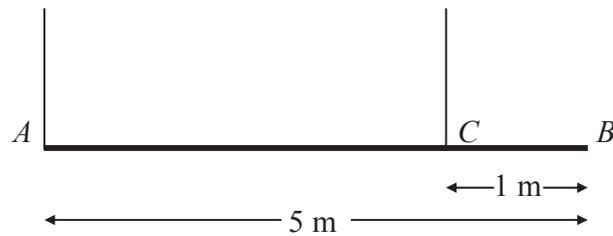


Figure 2

A beam AB has mass 12 kg and length 5 m. It is held in equilibrium in a horizontal position by two vertical ropes attached to the beam. One rope is attached to A , the other to the point C on the beam, where $BC = 1$ m, as shown in Figure 2. The beam is modelled as a uniform rod, and the ropes as light strings.

(a) Find

- (i) the tension in the rope at C ,
- (ii) the tension in the rope at A .

(5)

A small load of mass 16 kg is attached to the beam at a point which is y metres from A . The load is modelled as a particle. Given that the beam remains in equilibrium in a horizontal position,

(b) find, in terms of y , an expression for the tension in the rope at C .

(3)

The rope at C will break if its tension exceeds 98 N. The rope at A cannot break.

(c) Find the range of possible positions on the beam where the load can be attached without the rope at C breaking.

(3)
